

SECTION 07811
SPRAYED FIRE-RESISTIVE MATERIALS

PART 1 - GENERAL

0.1 DESCRIPTION OF WORK

- A.** Work Included: This Section specifies the following.
1. Concealed sprayed fire-resistive materials.
 2. Exposed sprayed fire-resistive materials.
- B.** Related Work: The following items are not included in this Section and will be performed under the designated Sections:
1. Section 03300 - CAST-IN-PLACE CONCRETE: Concrete protecting structural steel.
 2. Section 04800 - MASONRY: Masonry protecting structural steel.
 3. Section 05100 - STRUCTURAL STEEL: Surface conditions required for structural steel receiving sprayed fire-resistive materials.
 4. Section 07840 - FIRESTOPPING: Firestopping and firesafing insulation.
 5. Section 09260 - GYPSUM BOARD ASSEMBLIES: Fire-resistance-rated assemblies.
 6. Section 09265 - GYPSUM BOARD SHAFTWALL ASSEMBLIES: Fire-resistance-rated assemblies.

0.2 SUBMITTALS

- A.** Product Data: For each type of product indicated.
- B.** Shop Drawings: Structural framing plans indicating the following:
1. Locations and types of surface preparations required before applying sprayed fire-resistive material.
 2. Extent of sprayed fire-resistive material for each construction and fire-resistance rating, including the following:
 - a. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - b. Minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies.
 3. Treatment of sprayed fire-resistive material after application.

- C.** Samples for Verification: For each type of colored, exposed sprayed fire-resistive material, two Samples, each 4 inches square, of each color, texture, and material formulation to be applied. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- D.** Qualification Data: For Installer, manufacturer, and testing agency.
- E.** Compatibility and Adhesion Test Reports: From sprayed fire-resistive material manufacturer indicating the following:
 - 1. Materials have been tested for bond with substrates.
 - 2. Materials have been verified by sprayed fire-resistive material manufacturer to be compatible with substrate primers and coatings.
 - 3. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F.** Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for proposed sprayed fire-resistive materials.

0.3 QUALITY ASSURANCE

- A.** Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its sprayed fire-resistive materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.
 - 1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility for designation of restrained and unrestrained conditions.
- B.** Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- C.** Source Limitations: Obtain sprayed fire-resistive materials through one source from a single manufacturer.
- D.** Sprayed Fire-Resistive Materials Testing: By a qualified testing and inspecting agency engaged by Contractor or manufacturer to test for compliance with specified requirements for performance and test methods.
 - 1. Sprayed fire-resistive materials are randomly selected for testing from bags bearing the applicable classification marking of UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

2. Testing is performed on specimens of sprayed fire-resistive materials that comply with laboratory testing requirements specified in Part 2 and are otherwise identical to installed fire-resistive materials, including application of accelerant, sealers, topcoats, tamping, troweling, rolling, and water overspray, if any of these are used in final application.
 3. Testing is performed on specimens whose application the independent testing and inspecting agency witnessed during preparation and conditioning. Include in test reports a full description of preparation and conditioning of laboratory test specimens.
- E. Compatibility and Adhesion Testing:** Engage a qualified testing and inspecting agency to test for compliance with requirements for specified performance and test methods.
1. Test for bond per ASTM E 736 and requirements in UL's "Fire Resistance Directory" for coating materials. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 2. Verify that manufacturer, through its own laboratory testing or field experience, has not found primers or coatings to be incompatible with sprayed fire-resistive material.
- F. Fire-Test-Response Characteristics:** Provide sprayed fire-resistive materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify bags containing sprayed fire-resistive materials with appropriate markings of applicable testing and inspecting agency.
1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency acceptable to authorities having jurisdiction, for sprayed fire-resistive material serving as direct-applied protection tested per ASTM E 119.
 2. Surface-Burning Characteristics: ASTM E 84.
- G.** Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy".
- H. Preinstallation Conference:** Conduct conference at Project site to comply with requirements in Division 1. Review methods and procedures related to sprayed fire-resistive materials including, but not limited to, the following:
1. Review and finalize construction schedule and verify sequencing and coordination requirements.

0.4 DELIVERY, STORAGE, AND HANDLING

- A.** Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, shelf life if applicable, and fire-resistance ratings applicable to Project.
- B.** Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.
- C.** Store materials inside, under cover, aboveground, and kept dry until ready for use. Remove from Project site and discard wet or deteriorated materials.

0.5 PROJECT CONDITIONS

- A.** Environmental Limitations: Do not apply sprayed fire-resistive material when ambient or substrate temperature is 40 deg F or lower unless temporary protection and heat is provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B.** Ventilation: Ventilate building spaces during and after application of sprayed fire-resistive material. Use natural means or, if they are inadequate, forced-air circulation until fire-resistive material dries thoroughly.

0.6 COORDINATION

- A.** Sequence and coordinate application of sprayed fire-resistive materials with other related work specified in other Sections to comply with the following requirements:
 - 1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
 - 2. Provide temporary enclosures for applications to prevent deterioration of fire-resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
 - 3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
 - 4. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
 - 5. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.

6. Except for thin-film intumescent fireproofing, do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
7. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
8. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, and tested and corrections have been made to defective applications.

0.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace sprayed fire-resistive materials that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 1. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of sprayed fire-resistive materials from substrates.
 2. Not covered under the warranty are failures due to damage by occupants and maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
- B. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

0.1 CONCEALED SPRAYED FIRE-RESISTIVE MATERIALS

- A. General: For concealed applications of sprayed fire-resistive materials, provide manufacturer's standard products complying with requirements indicated for material composition and physical properties representative of installed products.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Cementitious Sprayed Fire-Resistive Material:
 - a. Carbolite Co., Fireproofing Products Div.; Pyrolite 15 High Yield.
 - b. Grace, W. R. & Co.--Conn., Construction Products Div.; Monokote Type MK-6/HY.
 - c. Isolatek International Corp., Cafco Products; Cafco 300.

- d. Southwest Vermiculite Co., Inc.; 5EF.
- C.** Material Composition: Cementitious sprayed fire-resistive material consisting of factory-mixed, dry formulation of gypsum or Portland cement binders and lightweight mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.
- D.** Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property as follows:
1. Dry Density: 15 lb/cu. ft. for average and individual densities regardless of density indicated in referenced fire-resistance design, or greater if required to attain fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method".
 2. Thickness: Provide minimum average thickness required for fire-resistance design indicated according to the following criteria, but not less than 0.375 inch, per ASTM E 605:
 - a. Where the referenced fire-resistance design lists a thickness of 1 inch or greater, the minimum allowable individual thickness of sprayed fire-resistive material is the design thickness minus 0.25 inch.
 - b. Where the referenced fire-resistance design lists a thickness of less than 1 inch but more than 0.375 inch, the minimum allowable individual thickness of sprayed fire-resistive material is the greater of 0.375 inch or 75 percent of the design thickness.
 - c. No reduction in average thickness is permitted for those fire-resistance designs whose fire-resistance ratings were established at densities of less than 15 lb/cu. ft.
 3. Bond Strength: 150 lbf/sq. ft. minimum per ASTM E 736 under the following conditions:
 - a. Field test sprayed fire-resistive material that is applied to flanges of wide-flange, structural steel members on surfaces matching those that will exist for remainder of steel receiving fire-resistive material.
 - b. If surfaces of structural steel receiving sprayed fire-resistive material are primed or otherwise painted for coating materials, perform series of bond tests specified in UL's "Fire Resistance Directory". Provide bond strength indicated in referenced UL fire-resistance criteria, but not less than 150 lbf/sq. ft. minimum per ASTM E 736.
 - c. Minimum thickness of sprayed fire-resistive material tested in laboratory shall be 0.75 inch.
 4. Compressive Strength: 5.21 lbf/sq. in. as determined in the laboratory per ASTM E 761. Minimum thickness of sprayed fire-

resistive material tested shall be 0.75 inch and minimum dry density shall be as specified, but not less than 15 lb/cu. ft.

5. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
6. Deflection: No cracking, spalling, or delamination per ASTM E 759.
7. Effect of Impact on Bonding: No cracking, spalling, or delamination per ASTM E 760.
8. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours per ASTM E 859. For laboratory tests, minimum thickness of sprayed fire-resistive material is 0.75 inch maximum dry density is 15 lb/cu. ft. test specimens are not prepurged by mechanically induced air velocities, and tests are terminated after 24 hours.
9. Fungal Resistance: No observed growth on specimens per ASTM G 21.

0.2 EXPOSED CEMENTITIOUS SPRAYED FIRE-RESISTIVE MATERIALS

- A.** General: For exposed applications of sprayed fire-resistive materials, provide manufacturer's standard products complying with manufacturer's published performance for material composition and for minimum physical properties of each product listed, measured by standard test methods referenced with each property.
- B.** Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Exposed Cementitious Sprayed Fire-Resistive Material:
 - a. Carboline Co., Fireproofing Products Div.; Pyrocrete 239.
 - b. Grace, W. R. & Co.--Conn., Construction Products Div.; Monokote Type Z106.
 - c. Isolatek International Corp., Cafco Products; Cafco 400.
 - d. York, Inc.; -MD.
 - e. Southwest Vermiculite Co., Inc.; FW7.

0.3 EXPOSED INTUMESCENT MASTIC FIRE-RESISTIVE COATINGS

- A.** Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Fire-Resistive, Water-Based Intumescent Mastic Coating Material:
 - a. A/D Fire Protection Systems Inc.; Firefilm II and Colorcoat.
 - b. Albi Manufacturing, Division of StanChem Inc.; Albi Clad TF.
 - c. Carboline Co., Fireproofing Products Div.; Nullifire S607 and Topseal.
 - d. Isolatek International Corp., Cafco Products; Cafco SprayFilm-WB II Basecoat and Topseal.

- B.** Thin-Film Fire-Resistive Intumescent Mastic Coating: Factory-mixed formulation.
 - 1. Water-Based Formulation: Approved by manufacturer and authorities having jurisdiction for interior use.
 - 2. Multi component system consisting of intumescent base coat and topcoat.
- C.** Color and Gloss: As indicated by manufacturer's designations.

0.4 AUXILIARY FIRE-RESISTIVE MATERIALS

- A.** General: Provide auxiliary fire-resistive materials that are compatible with sprayed fire-resistive materials and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B.** Substrate Primers: For use on each substrate and with each sprayed fire-resistive product, provide primer that complies with one or more of the following requirements:
 - 1. Primer's bond strength complies with requirements specified in UL's "Fire Resistance Directory", for coating materials based on a series of bond tests per ASTM E 736.
 - 2. Primer is identical to those used in assemblies tested for fire-test-response characteristics of sprayed fire-resistive material per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- C.** Adhesive for Bonding Fire-Resistive Material: Product approved by manufacturer of sprayed fire-resistive material.
- D.** Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistance designs indicated and fire-resistive material manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive sprayed fire-resistive material.
- E.** Reinforcing Fabric: Glass-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated, approved by manufacturer of intumescent mastic coating fire-resistive material.

PART 3 - EXECUTION

0.1 EXAMINATION

- A.** Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of work. A substrate is in satisfactory condition if it complies with the following:
 - 1. Substrates comply with requirements in the Section where the substrate and related materials and construction are specified.
 - 2. Substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt, or other foreign substances capable of impairing bond of fire-resistive materials with substrates under conditions of normal use or fire exposure.
 - 3. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 4. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.
- B.** Conduct tests according to fire-resistive material manufacturer's written recommendations to verify that substrates are free of oil, rolling compounds, and other substances capable of interfering with bond.
- C.** Proceed with installation only after unsatisfactory conditions have been corrected.

0.2 PREPARATION

- A.** Cover other work subject to damage from fallout or overspray of fire-resistive materials during application.
- B.** Clean substrates of substances that could impair bond of fire-resistive material, including dirt, oil, grease, release agents, rolling compounds, loose mill scale, and incompatible primers, paints, and encapsulants.
- C.** For exposed applications, repair substrates to remove any surface imperfections that could affect uniformity of texture and thickness in finished surface of sprayed fire-resistive material. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

0.3 INSTALLATION, GENERAL

- A.** Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to

mix, convey, and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

- B.** Apply sprayed fire-resistive material that is identical to products tested as specified in Part 1 "Quality Assurance" Article and substantiated by test reports, with respect to rate of application, accelerator use, sealers, topcoats, tamping, troweling, water overspray, or other materials and procedures affecting test results.
- C.** Install metal lath, as required, to comply with fire-resistance ratings and fire-resistive material manufacturer's written recommendations for conditions of exposure and intended use. Securely attach lath to substrate in position required for support and reinforcement of fire-resistive material. Use anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer. Attach lathing accessories where indicated or required for secure attachment to substrate.
- D.** Coat substrates with adhesive before applying fire-resistive material where required to achieve fire-resistance rating or as recommended in writing by sprayed fire-resistive material manufacturer for material and application indicated.
- E.** Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by sprayed fire-resistive material manufacturer, install body of fire-resistive covering in a single course.
- F.** Spray apply fire-resistive materials to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.
- G.** Where sealers are used, apply products that are tinted to differentiate them from sprayed fire-resistive material over which they are applied.

0.4 INSTALLATION, CONCEALED SPRAYED FIRE-RESISTIVE MATERIALS

- A.** Apply concealed sprayed fire-resistive material in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition, but apply in greater thicknesses and densities if specified in Part 2 "Concealed Sprayed Fire-Resistive Materials" Article.

0.5 INSTALLATION, EXPOSED SPRAYED FIRE-RESISTIVE MATERIALS

- A.** Apply exposed sprayed fire-resistive material in thicknesses and densities not less than those required to achieve fire-resistance ratings designated

for each condition, but apply in greater thicknesses and densities if indicated.

- B.** Provide a uniform finish complying with description indicated for each type of material and matching Engineer's sample or, if none, finish approved for field-erected mockup.
- C.** Apply exposed cementitious sprayed fire-resistive material to produce the following finish:
 - 1. Spray-textured finish with no further treatment.
- D.** Apply thin-film intumescent mastic fire-resistive coating as follows:
 - 1. Finish: Spray apply successive base coat(s) and finish topcoat. Allow to dry and cure between coats. Before applying finish topcoat, determine required dry film thickness according to manufacturer's written recommendations.
- E.** Cure exposed cementitious sprayed fire-resistive material according to product manufacturer's written recommendations to prevent premature drying.

0.6 FIELD QUALITY CONTROL

- A.** Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B.** Remove and replace applications of sprayed fire-resistive material where test results indicate that it does not comply with specified requirements for cohesion and adhesion, for density, or for both.
- C.** Apply additional sprayed fire-resistive material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.
- D.** Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

0.7 CLEANING, PROTECTING, AND REPAIR

- A.** Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from

surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

- B.** Protect sprayed fire-resistive material, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at time of Substantial Completion.
- C.** Coordinate application of sprayed fire-resistive material with other construction to minimize need to cut or remove fire protection. As installation of other construction proceeds, inspect sprayed fire-resistive material and patch any damaged or removed areas.
- D.** Repair or replace work that has not been successfully protected.

PART 4 - MEASUREMENT AND PAYMENT

0.1 MEASUREMENT

- A.** Sprayed fire-resistive materials will be measured as per square foot complete in place, including all preparation, accessories and incidentals.

0.2 PAYMENT

- A.** Payment for sprayed fire-resistive materials will be made at the Contract unit price for the quantities as specified above.

0.3 PAYMENT ITEMS

ITEM NO.	DESCRIPTION	UNIT
0720.107	SPRAYED-ON FIREPROOFING	SF

END OF SECTION

NOTES TO THE DESIGNER

- A.** Any request to modify or waive the specification requirements listed below must be approved in writing by the MBTA's Director of Design:

1. None